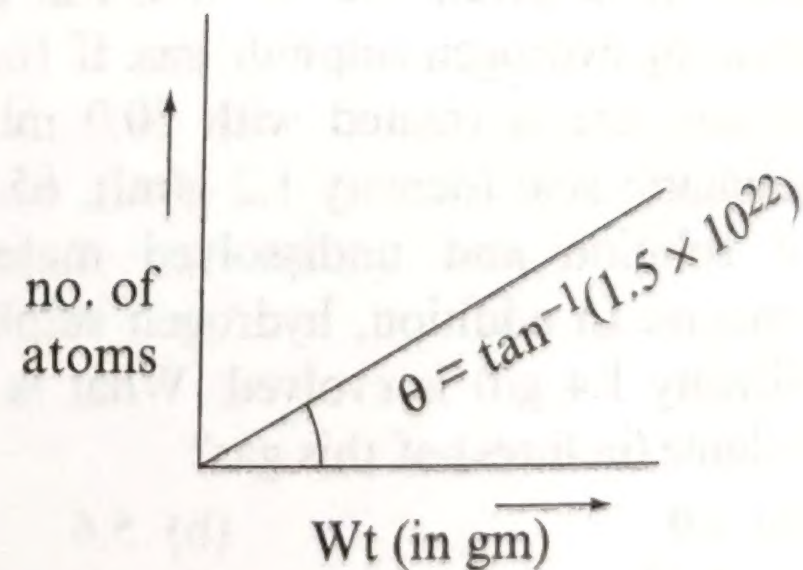## Atomic Mass

11. The mass of 3.2×10^5 atoms of an element is 8.0×10^{-18} g. The atomic mass of the element is about ($N_A = 6 \times 10^{23}$)

    (a) 2.5×10^{-22}

    (b) 15

    (c) 8.0×10^{-18}

    (d) 30

12. A graph is plotted for an element, by putting its mass on X-axis and the corresponding number of number of atoms on Y-axis. What is the atomic mass of the element for which the graph is plotted? ($N_A = 6.0 \times 10^{23}$)

no. of atoms

$\theta = \tan^{-1}(1.5 \times 10^{22})$

Wt (in gm)

    (a) 80

    (b) 40

    (c) 0.025

    (d) 20

13. If 'NEERAJ KUMAR' is written by graphite pencil, it weighs 3.0×10^{-10} g. How many carbon atoms are present in it? ($N_A = 6 \times 10^{23}$)
    - (a) 1.5×10^{13}
    - (b) 5×10^{12}
    - (c) 2×10^{33}
    - (d) 1.5×10^{10}

14. The atomic masses of two elements P and Q are 20 and 40, respectively. If 'a' g of P contains 'b' atoms, how many atoms are present in '$2a$' g of Q?
    - (a) a
    - (b) b
    - (c) $2a$
    - (d) $2b$

15. The molecular formula of a compound is X_4O_9. If the compound contains 40% X, by mass, what is the atomic mass of X?
    - (a) 24
    - (b) 12
    - (c) 26
    - (d) 13

16. A quantity of 1 g of metallic carbonate XCO_3 is completely converted into a chloride XCl_2 weighing 1.11 g. The atomic mass of the element 'X' is
    - (a) 10
    - (b) 20
    - (c) 30
    - (d) 40

17. An element, X, have three isotopes X^{20}, X^{21} and X^{22}. The percentage abundance of X^{20} is 90% and its average atomic mass of the element is 20.18. The percentage abundance of X^{21} should be
    - (a) 2%
    - (b) 8%
    - (c) 10%
    - (d) 0%

18. A sample of hydrogen gas is collected and it is observed that it contains only hydrogen and deuterium atoms in the atomic ratio 6000:1. The number of neutrons in 3.0 g of such a sample should be nearly
    - (a) 0.0005
    - (b) 3.01×10^{20}
    - (c) 1.80×10^{24}
    - (d) 1.0

19. If isotopic distribution of C^{12} and C^{14} is 98.0% and 2.0%, respectively, then the number of C^{14} atoms in 12 g of carbon is
    - (a) 1.032×10^{22}
    - (b) 1.20×10^{22}
    - (c) 5.88×10^{23}
    - (d) 6.02×10^{23}

20. The fractional abundance of Cl^{35} in a sample of chlorine containing only Cl^{35} (atomic weight = 34.9) and Cl^{37} (atomic weight = 36.9) isotopes, is 0.6. The average mass number of chlorine is
    - (a) 35.7
    - (b) 35.8
    - (c) 18.8
    - (d) 35.77

Molecular Mass

21. Twenty molecules of SO_3 will weigh as much as ..... molecules of oxygen.
    - (a) 100
    - (b) 50
    - (c) 15
    - (d) 8

22. The mass of CO_2 that must be mixed with 20 g of oxygen such that 27 ml of a sample of the resulting mixture would contain equal number of molecules of each gas
    - (a) 13.75 g
    - (b) 27.50 g
    - (c) 41.25 g
    - (d) 55 g

23. A mixture of 2×10^{21} molecules of P and 3×10^{21} molecules of Q weighs 0.60 g. If the molecular mass of P is 45, the molecular mass of Q will be ($N_A = 6 \times 10^{23}$)
    - (a) 45
    - (b) 180
    - (c) 90
    - (d) 270

24. The shape of tobacco mosaic virus (TMV) is cylindrical, having length 3000 Å and diameter 170 Å. If the specific volume of virus is 12.5 ml/g, the molecular mass of TMV is ($N_A = 6 \times 10^{23}$)
    - (a) 3.28
    - (b) 5.44×10^{-24}
    - (c) 5.44×10^{-18}
    - (d) 3.28×10^6

25. The density of a DNA sample is 1.1g/ml and its molar mass determined by cryoscopic method was found to be 6×10^8 g/mole. What is the volume occupied by one DNA molecule? ($N_A = 6 \times 10^{23}$)

(a) 5.45×10^8 ml
(b) 1.83×10^{-9} ml
(c) 9.06×10^{-16} ml
(d) 1.09×10^{-13} ml

26. How many atoms do mercury vapour molecules consist of if the density of mercury vapour relative to air is 6.92? The average mass of air is 29 g per mole. ($Hg = 200$)

(a) 1
(b) 2
(c) 4
(d) Infinite

27. Vapour density of a volatile substance is 1.2 ($C_2H_6 = 1$). Its molecular mass would be

(a) 1.2
(b) 2.4
(c) 36
(d) 72

28. A compound contains 7 carbon atoms, 2 oxygen atoms and 9.96×10^{-24} g of other elements. The molecular mass of compound is ($N_A = 6 \times 10^{23}$)

(a) 122
(b) 116
(c) 148
(d) 154

29. If the mass of neutron is doubled and that of proton is halved, the molecular mass of H_2O containing only H^1 and O^{16} atoms, will

(a) increase by about 25%
(b) decrease by about 25%
(c) increase by about 14%
(d) decrease by about 14%

30. Out of 1.0 g dioxygen, 1.0 g atomic oxygen and 1.0 g ozone, the maximum number of oxygen atoms are contained in

(a) 1.0 g of atomic oxygen
(b) 1.0 g of ozone
(c) 1.0 g of oxygen gas
(d) All contain the same number of atoms

31. Total number of electrons present in 4.4 g oxalate ion ($C_2O_4^{2-}$) is

(a) $0.05N_A$
(b) $2.3N_A$
(c) $2.2N_A$
(d) $2.1N_A$

32. Total number of valence electrons present in 6.4 g peroxides ion (O_2^{2-}) is

(a) $0.2N_A$
(b) $3.2N_A$
(c) $3.6N_A$
(d) $2.8N_A$

33. The number of F^- ions in 4.2 g AlF_3 is ($Al = 27$, $F = 19$)

(a) 0.05
(b) 9.03×10^{22}
(c) 3.01×10^{22}
(d) 0.15

34. A quantity of 13.5 g of aluminium when changes to Al^{3+} ion in solution, will lose ($Al = 27$)

(a) 18.0×10^{23} electrons
(b) 6.02×10^{23} electrons
(c) 3.01×10^{23} electrons
(d) 9.1×10^{23} electrons

35. If an iodized salt contains 1% of KI and a person takes 2 g of the salt every day, the iodine ions going into his body everyday would be approximately ($K = 39$, $I = 127$)

(a) 7.2×10^{21}
(b) 7.2×10^{19}
(c) 3.6×10^{21}
(d) 9.5×10^{19}

Calculation of Mole

36. Dopamine is a neurotransmitter, a molecule that serves to transmit message in the brain. The chemical formula of dopamine is $C_8H_{11}O_2N$. How many moles are there in 1 g of dopamine?
    (a) 0.00654
    (b) 153
    (c) 0.0654
    (d) None of these

37. Ethanol is the substance commonly called alcohol. The density of liquid alcohol is 0.8 g/ml at 293 K. If 1.2 moles of ethanol is needed for a particular experiment, what volume of ethanol should be measured out?
    (a) 55.2 ml
    (b) 57.5 ml
    (c) 69 ml
    (d) 47.9 ml

38. The volume of one mole of water at 277 K is 18 ml. One ml of water contains 20 drops. The number of molecules in one drop of water will be ($N_A = 6 \times 10^{23}$)
    (a) 1.07×10^{21}
    (b) 1.67×10^{21}
    (c) 2.67×10^{21}
    (d) 1.67×10^{20}

39. A given mixture consists only of pure substance X and pure substance Y. The total mass of the mixture is 3.72 g. The total number of moles is 0.06. If the mass of one mole of Y is 48 g and there is 0.02 mole of X in the mixture, what is the mass of one mole of X?
    (a) 90 g
    (b) 75 g
    (c) 45 g
    (d) 180 g

40. Number of gas molecules present in 1 ml of gas at 0°C and 1 atm is called Loschmidt number. Its value is about
    (a) 2.7×10^{19}
    (b) 6×10^{23}
    (c) 2.7×10^{22}
    (d) 1.3×10^{28}

41. A quantity of 0.25 g of a substance when vaporized displaced 50 cm^3 of air at 0°C and 1 atm. The gram molecular mass of the substance will be
    (a) 50 g
    (b) 100 g
    (c) 112 g
    (d) 127.5 g

42. An amount of 6 moles of Cl-atoms at STP occupies a volume of
    (a) 134.4 l
    (b) 67.2 l
    (c) 68.1 l
    (d) 136.2 l

43. While resting, the average 70 kg human male consumes 16.628 l of oxygen per hour at 27°C and 100 kPa. How many moles of oxygen are consumed by the 70 kg man while resting for 1hour?
    (a) 0.67
    (b) 66.7
    (c) 666.7
    (d) 67.5

44. One molecule of haemoglobin will combine with four molecules of oxygen. If 1.0 g of haemoglobin combines with 1.642 ml of oxygen at body temperature (27°C) and a pressure of 760 torr, what is the molar mass of haemoglobin?
    (a) 6,00,000
    (b) 1,50,000
    (c) 15,000
    (d) 60,000

45. A quantity of 2.0 g of a triatomic gaseous element was found to occupy a volume of 448 ml at 76 cm of Hg and 273 K. The mass of its each atom is
    (a) 100 amu
    (b) 5.53×10^{-23} g
    (c) 33.3 g
    (d) 5.53 amu

46. Most abundant element dissolved in sea water is chlorine at a concentration of 19 g/kg of sea water. The volume of earth's ocean is 1.4×10^{21} l. How many g-atoms of chlorine are potentially available from the oceans? Density of sea water is 1 g/ml. ($N_A = 6 \times 10^{23}$)
    (a) 7.5×10^{20}
    (b) 27×10^{21}
    (c) 27×10^{24}
    (d) 7.5×10^{19}

47. From 2 mg calcium, 1.2×10^{19} atoms are removed. The number of g-atoms of calcium left is $(Ca = 40)$

(a) 5×10^{-5}

(b) 2×10^{-5}

(c) 3×10^{-5}

(d) 5×10^{-6}

48. The number of g-molecules of oxygen in 6.023×10^{24} CO molecules is

(a) 1 g-molecule

(b) 0.5 g-molecule

(c) 5 g-molecules

(d) 10 g-molecules

49. Equal masses of oxygen, hydrogen and methane are taken in identical conditions. What is the ratio of the volumes of the gases under identical conditions?

(a) 16:1:8

(b) 1:16:2

(c) 1:16:8

(d) 2:16:1

50. A pre-weighed vessel was filled with oxygen at NTP and weighed. It was then evacuated, filled with SO_2 at the same temperature and pressure, and again weighed. The weight of oxygen is

(a) the same as that of SO_2

(b) $\dfrac{1}{2}$ that of SO_2

(c) twice that of SO_2

(d) $\dfrac{1}{4}$ that of SO_2

Percentage Composition

61. The commonly used pain reliever, aspirin, has the molecular formula $C_9H_8O_4$. If a sample of aspirin contains 0.968 g of carbon, what is the mass of hydrogen in the sample?

(a) 0.717 g   (b) 0.0717 g
(c) 8.000 g   (d) 0.645 g

62. For $CuSO_4 \cdot 5H_2O$, which is the correct mole relationship?

(a) $9 \times$ mole of Cu = mole of O
(b) $5 \times$ mole of Cu = mole of O
(c) $9 \times$ mole of Cu = mole of O_2
(d) mole of Cu = $5 \times$ mole of O

63. The percentage of Fe(III) present in iron ore $Fe_{0.93}O_{1.00}$ is (Fe = 56)

(a) 94   (b) 6
(c) 21.5   (d) 15

64. A quantity of 5 g of a crystalline salt when rendered anhydrous lost 1.8 g of water. The formula mass of the anhydrous salt is 160. The number of molecules of water of crystallization in the salt is

(a) 3   (b) 5
(c) 2   (d) 1

65. Cortisone is a molecular substance containing 21 atoms of carbon per molecule. The mass percentage of carbon in cortisone is 69.98%. What is the molecular mass of cortisone?

(a) 180.05   (b) 360.1
(c) 312.8   (d) 205.8

66. A polystyrene of formula $Br_3C_6H_2(C_8H_8)_n$ was prepared by heating styrene with tribromobenzyl peroxide in the absence of air. It was found to contain 10.46% bromine, by mass. The value of n is (Br = 80)

(a) 20   (b) 21
(c) 19   (d) 22

67. A compound contains 36% carbon, by mass. If each molecule contains two carbon atoms, the number of moles of compound in its 10 g is

(a) 66.67   (b) 0.15
(c) 0.30   (d) 1.5

68. The percentage of oxygen in a compound is 4%. Its minimum molecular mass will be

(a) 100   (b) 400
(c) 200   (d) 32

69. In Dumas method, 0.2 g of an organic nitrogenous compound gave 28 ml of N_2 (volume reduced to 0°C and 1 atm). What is the percentage of nitrogen, by mass, in the compound?

(a) 17.5   (b) 8.75
(c) 35.0   (d) 14.0

70. A quantity of 0.2 g of an organic compound containing, C, H and O, on combustion yielded 0.147 g CO_2 and 0.12 g water. The percentage of oxygen in it is

(a) 73.29%   (b) 78.45%
(c) 83.23%   (d) 89.50%

Empirical and Molecular Formula

71. The empirical formula of an organic gaseous compound containing carbon and hydrogen is CH_2. The volume occupied by certain mass of this gas is exactly half of the volume occupied by the same mass of nitrogen gas under identical conditions. The molecular formula of the organic gas is

(a) C_2H_4 (b) CH_2

(c) C_6H_{12} (d) C_4H_8

72. A compound has carbon, hydrogen, and oxygen in 3:3:1 atomic ratio. If the number of moles in 1 g of the compound is 6.06×10^{-3}, the molecular formula of the compound will be

(a) C_3H_3O

(b) $C_6H_6O_2$

(c) $C_9H_9O_3$

(d) $C_{12}H_{12}O_4$

73. A compound having the empirical formula, C_3H_4O, has a molecular weight of 170 ± 5. The molecular formula of the compound is

(a) C_3H_4O

(b) $C_6H_8O_2$

(c) $C_6H_{12}O_3$

(d) $C_9H_{12}O_3$

74. It was found from the chemical analysis of a gas that it has two hydrogen atoms for each carbon atom. At 0°C and 1 atm, its density is 1.25 g per litre. The formula of the gas would be

(a) CH_2 (b) C_2H_4

(c) C_2H_6 (d) C_4H_8

75. A quantity of 1.4 g of a hydrocarbon gives 1.8 g water on complete combustion. The empirical formula of hydrocarbon is

(a) CH

(b) CH_2

(c) CH_3

(d) CH_4

76. An organic compound contains 40% carbon and 6.67% hydrogen by mass. Which of the following represents the empirical formula of the compound?

(a) CH_2

(b) CH_2O

(c) C_2H_4O

(d) CH_3O

77. A compound contains elements X and Y in 1:4 mass ratio. If the atomic masses of X and Y are in 1:2 ratio, the empirical formula of compound should be

(a) XY_2 (b) X_2Y

(c) XY_4 (d) X_4Y

78. A compound contains equal masses of the elements A, B and C. If the atomic masses of A, B and C are 20, 40 and 60, respectively, the empirical formula of the compound is

(a) A_3B_2C

(b) AB_2C_3

(c) ABC

(d) $A_6B_3C_2$

79. A gaseous oxide contains 30.4% of nitrogen, one molecule of which contains one nitrogen atom. The density of the oxide relative to oxygen, under identical conditions, is about

(a) 0.69   (b) 1.44

(c) 0.35   (d) 2.88

80. Iron form two oxides. If for the same mass of iron, mass of oxygen combined in the first oxide is two-third of the mass of oxygen combined in the second oxide, the ratio of valency of iron in first and second oxide is

(a) 1:1

(b) 2:3

(c) 3:2

(d) 2:5

Stoichiometry

81. When a certain amount of octane, C_8H_{18}, is burnt completely, 7.04 g CO_2 is formed. What is the mass of H_2O formed, simultaneously?
   - (a) 1.62 g
   - (c) 6.48 g
   - (c) 3.24 g
   - (d) 2.28 g

82. If rocket were fuelled with kerosene and liquid oxygen, what mass of oxygen would be required for every litre of kerosene? Assume kerosene to have the average composition $C_{14}H_{30}$ and density, 0.792 g/ml.
   - (a) 5.504 kg
   - (b) 2.752 kg
   - (c) 1.376 kg
   - (d) 3.475 kg

83. Air contains 20% O_2, by volume. What volume of air is needed at 0°C and 1 atm for complete combustion of 80 g methane?
   - (a) 10 l
   - (b) 50 l
   - (c) 224 l
   - (d) 1120 l

84. Acrylonitrile, C_3H_3N, is the starting material for the production of a kind of synthetic fibre (acrylics). It can be made from propylene, C_3H_6, by reaction with nitric oxide, NO.

   $$C_3H_6(g) + NO(g) \rightarrow C_3H_3N(g) + H_2O(g) + N_2(g) \text{ (Unbalanced)}$$

   How many grams acrylonitrile may be obtained from 420 kg of propylene and excess NO?
   - (a) 265 kg
   - (b) 530 kg
   - (c) 1060 kg
   - (d) 795 kg

85. A quantity of 2.76 g of silver carbonate on being strongly heated yields a residue weighing (Ag = 108)
   - (a) 2.16 g
   - (b) 2.48 g
   - (c) 2.32 g
   - (d) 2.64 g

86. How many litres of detonating gas may be produced at 0°C and 1 atm from the decomposition of 0.1 mole of water, by an electric current?
   - (a) 2.24 l
   - (b) 1.12 l
   - (c) 3.36 l
   - (d) 4.48 l

87. What mass of solid ammonium carbonate $H_2NCOONH_4$, when vaporized at 273°C, will have a volume of 8.96 l at 760 mm of pressure. Assume that the solid completely decomposes as

   $$H_2NCOONH_4(s) \rightarrow CO_2(g) + 2NH_3(g)$$
   - (a) 15.6 g
   - (b) 5.2 g
   - (c) 46.8 g
   - (d) 7.8 g

88. The mass of sulphuric acid needed for dissolving 3 g magnesium carbonate is
   - (a) 3.5 g
   - (b) 7.0 g
   - (c) 1.7 g
   - (d) 17.0 g

89. Samples of 1.0 g of Al are treated separately with an excess of sulphuric acid and an excess of sodium hydroxide. The ratio of the number of moles of the hydrogen gas evolved is
   - (a) 1:1
   - (b) 3:2
   - (c) 2:1
   - (d) 9:4

90. The minimum mass of water needed to slake 1 kg of quicklime, assuming no loss by evaporation, is
   - (a) 243.2 g
   - (b) 642.8 g
   - (c) 160.7 g
   - (d) 321.4 g

91. When 20 g Fe_2O_3 is reacted with 50 g of HCl, $FeCl_3$ and H_2O are formed. The amount of unreacted HCl is (Fe = 56)
   - (a) 27.375 g
   - (b) 22.625 g
   - (c) 30 g
   - (d) 4.75 g

92. SO_2 gas is slowly passed through an aqueous suspension containing 12 g $CaSO_3$ till the milkiness just disappears. What amount of SO_2 would be required?
   - (a) 6.4 mole
   - (b) 0.3 mole
   - (c) 0.1 mole
   - (d) 0.2 mole

93. A mixture of N_2 and H_2 is caused to react in a closed container to form NH_3. The reaction ceases before either reactant has been totally consumed. At this stage, 2.0 moles each of N_2, H_2 and NH_3 are present. The moles of N_2 and H_2 present originally were, respectively,

(a) 4 and 4 moles
(b) 3 and 5 moles
(c) 3 and 4 moles
(d) 4 and 5 moles

94. An ore contains 2.296% of the mineral argentite, Ag_2S, by mass. How many grams of this ore would have to be processed in order to obtain 1.00 g of pure solid silver? (Ag = 108)

(a) 1.148 g
(b) 0.026 g
(c) 50 g
(d) 2.296 g

95. A power company burns approximately 500 tons of coal per day to produce electricity. If the sulphur content of the coal is 1.5%, by mass, how many tons SO_2 are dumped into the atmosphere, every day?

(a) 15.0
(b) 7.5
(c) 30.0
(d) 18.75

Limiting Reagent Based

96. An amount of 1.0×10^{-3} moles of Ag^+ and 1.0×10^{-3} moles of CrO_4^{2-} reacts together to form solid Ag_2CrO_4. What is the amount of Ag_2CrO_4 formed? (Ag = 108, Cr = 52)

(a) 0.332 g
(b) 0.166 g
(c) 332 g
(d) 166 g

97. An amount of 0.3 mole of $SrCl_2$ is mixed with 0.2 mole of K_3PO_4. The maximum moles of KCl which may form is

(a) 0.6
(b) 0.5
(c) 0.3
(d) 0.1

98. Large quantities of ammonia are burned in the presence of a platinum catalyst to give nitric oxide, as the first step in the preparation of nitric acid.

$NH_3(g) + O_2(g) \xrightarrow{Pt} NO(g) + H_2O(g)$
(Unbalanced)

Suppose a vessel contains 0.12 moles NH_3 and 0.14 moles O_2. How many moles of NO may be obtained?

(a) 0.120
(b) 0.112
(c) 0.140
(d) 0.070

99. Equal masses of iron and sulphur are heated together to form FeS. What fraction of the original mass of excess reactant is left unreacted? (Fe = 56, S = 32)

(a) 0.22
(b) 0.43
(c) 0.86
(d) 0.57

100. Hydrogen cyanide, HCN, is prepared from ammonia, air and natural gas (CH_4) by the following process.

$2NH_3(g) + 3O_2(g) + 2CH_4(g) \xrightarrow{Pt}$
$2HCN(g) + 6H_2O(g)$

If a reaction vessel contains 11.5 g NH_3, 10.0 g O_2, and 10.5 g CH_4, what is the maximum mass, in grams, of hydrogen cyanide that could be made, assuming the reaction goes to completion?

(a) 18.26 g
(b) 5.625 g
(c) 17.72 g
(d) 16.875 g

Sequential and Parallel Reactions

101. What mass of carbon disulphide, CS_2 can be completely oxidized to SO_2 and CO_2 by the oxygen liberated when 325 g of Na_2O_2 react with water?
    (a) 316.67 g
    (b) 52.78 g
    (c) 633.33 g
    (d) 211.11 g

102. An amount of 2 moles $KClO_3$ is decomposed completely to produce O_2 gas. How many moles of butane, C_4H_8 can be burnt completely by the O_2 gas produced?
    (a) 0.5
    (b) 1.0
    (c) 2.0
    (d) 3.0

103. On heating $KClO_3$ at a certain temperature, it is observed that one mole of $KClO_3$ yields one mole of O_2. What is the mole fraction of $KClO_4$ in the final solid mixture containing only KCl and $KClO_4$, the latter being formed by the parallel reaction?
    (a) 0.50
    (b) 0.25
    (c) 0.33
    (d) 0.67

104. When 12 g graphite is burnt in sufficient oxygen, CO as well as CO_2 is formed. If the product contains 40% CO and 60% CO_2 by mass and none of the reactant is left, what is the mass of oxygen gas used in combustion?
    (a) 24.0 g
    (b) 21.33 g
    (c) 23.8 g
    (d) 15.6 g

105. A mixture of 254 g of iodine and 142 g of chlorine is made to react completely to give a mixture of ICl and ICl_3. How many moles of each product are formed? (I = 127, Cl = 35.5)
    (a) 0.1 mol of ICl and 0.1 mol of ICl_3
    (b) 1.0 mol of ICl and 1.0 mol of ICl_3
    (c) 0.5 mol of ICl and 0.1 mol of ICl_3
    (d) 0.5 mol of ICl and 1.0 mol of ICl_3

Percentage Based

106. A quantity of 4.35 g of a sample of pyrolusite ore, when heated with conc. HCl, gave chlorine. The chlorine, when passed through potassium iodide solution, liberated 6.35 g of iodine. The percentage of pure MnO_2 in the pyrolusite ore is (Mn = 55, I = 127)
    (a) 40
    (b) 50
    (c) 60
    (d) 70

107. How many grams of 90% pure Na_2SO_4 can be produced from 250 g of 95% pure NaCl?
    (a) 640.6 g
    (b) 288.2 g
    (c) 259.4 g
    (d) 320.3 g

108. A quantity of 10 g of a piece of marble was put into excess of dilute HCl acid. When the reaction was complete, 1120 cm^3 of CO_2 was obtained at 0°C and 1 atm. The percentage of $CaCO_3$ in the marble is
    (a) 5%
    (b) 25%
    (c) 50%
    (d) 2.5%

109. A 1.50 g sample of potassium bicarbonate having 80% purity is strongly heated. Assuming the impurity to be thermally stable, the loss in weight of the sample, on heating, is
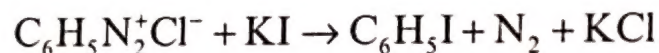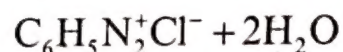   (a) 3.72 g
    (b) 0.72 g
    (c) 0.372 g
    (d) 0.186 g

110. Hydrazine N_2H_4 (used as a fuel in rocket system) can be produced according to the following reaction:

$$ClNH_2 + 2NH_3 \rightarrow N_2H_4 + NH_4Cl$$
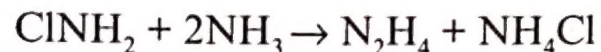
When 1.0 kg $ClNH_2$ is reacted with excess of NH_3, 473 g of N_2H_4 is produced. What is the percentage yield?

(a) 76.12   (b) 67.21
(c) 26.17   (d) 16.72

111. Two successive reactions, A $\rightarrow$ B and B $\rightarrow$ C, have yields of 90% and 80%, respectively. What is the overall percentage yield for conversion of A to C?

(a) 90%   (b) 80%
(c) 72%   (d) 85%

112. Iodobenzene is prepared from aniline $(C_6H_5NH_2)$ in a two-step process as shown here:

$$C_6H_5NH_2 + HNO_2 + HCl \longrightarrow$$

$$C_6H_5N_2^+Cl^- + 2H_2O$$

$$C_6H_5N_2^+Cl^- + KI \rightarrow C_6H_5I + N_2 + KCl$$

In an actual preparation, 9.30 g of aniline was converted to 16.32 g of iodobenzene. The percentage yield of iodobenzene is (I = 127)

113. One mole of a mixture of CO and CO_2 requires exactly 20 g of NaOH in solution for complete conversion of all the CO_2 into Na_2CO_3. How many grams more of NaOH would it require for conversion into Na_2CO_3 if the mixture (one mole) is completely oxidized to CO_2?

(a) 60 g   (b) 80 g
(c) 40 g   (d) 20 g

114. When burnt in air, 14.0 g mixture of carbon and sulphur gives a mixture of CO_2 and SO_2 in the volume ratio of 2:1, volume being measured at the same conditions of temperature and pressure. Moles of carbon in the mixture is

(a) 0.25   (b) 0.40
(c) 0.5   (d) 0.75

115. A mixture of NaI and NaCl on reaction with H_2SO_4 gave Na_2SO_4 equal to the weight of original mixture taken. The percentage of NaI in the mixture is (I = 127)

(a) 82.38   (b) 26.38
(c) 62.38   (d) 28.38

Answers (top of page, for Q110):
(a) 8%   (b) 50%
(c) 75%   (d) 80%

Atomic Mass

11. (b) 12. (b) 13. (a) 14. (b) 15. (a) 16. (d) 17. (a) 18. (b) 19. (b) 20. (b)

Molecular Mass

21. (b) 22. (b) 23. (c) 24. (d) 25. (c) 26. (a) 27. (c) 28. (a) 29. (c) 30. (d)
31. (b) 32. (d) 33. (b) 34. (d) 35. (b)

Calculation of Mole

36. (a) 37. (c) 38. (b) 39. (a) 40. (a) 41. (c) 42. (c) 43. (a) 44. (d) 45. (b)
46. (a) 47. (c) 48. (c) 49. (b) 50. (b)

Average Molecular Mass

51. (b) 52. (d) 53. (b) 54. (b) 55. (a) 56. (a) 57. (b) 58. (d) 59. (b) 60. (c)

Percentage Composition

61. (b) 62. (a) 63. (d) 64. (b) 65. (b) 66. (c) 67. (b) 68. (b) 69. (a) 70. (a)

Empirical and Molecular Formula

71. (d) 72. (c) 73. (d) 74. (b) 75. (b) 76. (b) 77. (a) 78. (d) 79. (b) 80. (b)

Stoichiometry

81. (c) 82. (b) 83. (d) 84. (b) 85. (a) 86. (c) 87. (b) 88. (a) 89. (a) 90. (d)
91. (b) 92. (c) 93. (b) 94. (c) 95. (a)

Limiting Reagent Based

96. (b) 97. (a) 98. (b) 99. (b) 100. (b)

Sequential and Parallel Reactions

101. (b) 102. (a) 103. (b) 104. (c) 105. (b)

Percentage Based

106. (b) 107. (d) 108. (a) 109. (c) 110. (a) 111. (c) 112. (d) 113. (a) 114. (c) 115. (d)